

CLAIMS

1. A vehicle integrated control system comprises a plurality of control units (PT, ECB, STR) operating autonomously for controlling a running state of a vehicle
5 based on a manipulation request,

wherein each control unit (PT, ECB, STR) comprises

a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a controller for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using
10 said control target,

said system further comprising

a processing unit (DSS, VDM) operating parallel to each said control unit (PT, ECB, STR), for generating and providing to each said control unit (PT, ECB, STR)
15 information to be used to modify said operation request or said control target, as necessary, at each said control unit (PT, ECB, STR).

2. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and
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a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

25 wherein each said control unit (PT, ECB, STR) comprises

a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to

manipulate an actuator set in correspondence with each unit using at least one of said information generated at said processing unit (DSS, VDM) and said sensed operation request.

- 5 3. A vehicle integrated control system comprising:
a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and
a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior,
10 and providing the generated information to each said control unit (PT, ECB, STR),
wherein each said control unit (PT, ECB, STR) comprises
a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR) and
a calculation unit for calculating information related to a control target to
15 manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request.

- 20 4. A vehicle integrated control system comprising:
a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and
a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),
25 wherein each said control unit (PT, ECB, STR) comprises
a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and
a calculation unit for calculating information related to a control target to

manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request.

- 5 5. A vehicle integrated control system comprising:
- a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,
- a first processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to
- 10 each said control unit (PT, ECB, STR),
- a second processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB,
- 15 STR), and
- a third processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),
- wherein each said control unit (PT, ECB, STR) comprises
- 20 a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and
- a first calculation unit for calculating first information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said first processing unit (DSS, VDM) and said sensed
- 25 operation request,
- a second calculation unit for calculating second information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said second processing unit (DSS, VDM) and said

calculated first information, and

a third calculation unit for calculating third information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said third processing unit (DSS, VDM) and said
5 calculated second information.

6. The vehicle integrated control system according to any of claims 2-5, wherein each unit operates autonomously and in parallel.

10 7. The vehicle integrated control system according to claim 1, 2 or 5, wherein said processing unit (DSS, VDM) or said first processing unit (DSS, VDM) comprises a sensing unit for sensing environmental information around said vehicle, a sensing unit for sensing information related to a driver of said vehicle, and a processing unit generating information processed such that said sensed
15 information is shared among each of said control unit (PT, ECB, STR).

8. The vehicle integrated control system according to claim 7, wherein said processing unit generates information representing a degree of correction with respect to a request of said driver at each said control unit (PT, ECB, STR).

20 9. The vehicle integrated control system according to claim 1, 3, or 5, wherein said processing unit (DSS, VDM) or said second processing unit (DSS, VDM) comprises a processing unit generating information processed so as to be shared among each said control unit (PT, ECB, STR), based on information for implementation of
25 automatic cruising or pseudo automatic cruising of said vehicle.

10. The vehicle integrated control system according to claim 9, wherein said processing unit generates information representing a degree of arbitration with respect

to said control target at each said control unit (PT, ECB, STR).

11. The vehicle integrated control system according to claim 1, 4 or 5, wherein said processing unit (DSS, VDM) or said third processing unit (DSS, VDM) comprises
5 a processing unit generating information processed so as to be shared among each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent with a control target, based on a current dynamic state of the vehicle.

12. The vehicle integrated control system according to claim 11, wherein said
10 processing unit generates information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).

13. The vehicle integrated control system according to any of claims 1-5,
wherein said control unit (PT, ECB, STR) comprises a driving system control unit (PT,
15 ECB, STR) and a brake system control unit (PT, ECB, STR),

wherein said driving system control unit (PT, ECB, STR) and said brake system control unit (PT, ECB, STR) have a driving force and braking force distributed with respect to a requested driving force so as to realize a desired behavior of the vehicle in co-operation.

14. The vehicle integrated control system according to any of claims 1-5,
wherein each said control unit (PT, ECB, STR) provides control such that reflection of information from said processing unit is rejected.

15. The vehicle integrated control system according to any of claims 3-5,
wherein each said control unit (PT, ECB, STR) outputs information to said processing unit (DSS, VDM), said second processing unit (DSS, VDM) or said third processing unit (DSS, VDM).

16. The vehicle integrated control system according to any of claims 1-5, wherein each said control unit (PT, ECB, STR) is realized by each ECU, and operation is executed at said each ECU from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator.

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17. The vehicle integrated control system according to any of claims 1-5, wherein

said driving system control unit (PT, ECB, STR) is realized by a first ECU,

said brake system control unit is realized by a second ECU,

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said steering system control unit is realized by a third ECU,

operation is executed from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator at each said ECU,

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said processing unit (DSS, VDM) is realized by a fourth ECU differing from said first, second and third ECUs,

said first to third ECUs have an operation controlled in parallel,

said fourth ECU is connected to an upper control hierarchy side of said first to third ECUs via an interface.

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18. A vehicle integrated control system comprises a plurality of control units (PT, ECB, STR) operating autonomously for controlling a running state of a vehicle based on a manipulation request,

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one

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control unit (PT, ECB, STR), and

controller means for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using said control target,

said system further comprising

a processing unit (DSS, VDM) operating parallel to each said control unit (PT, ECB, STR) for generating and providing to each said control unit (PT, ECB, STR) information to be used to modify said operation request or said control target, as
5 necessary, at each said control unit (PT, ECB, STR).

19. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

10 a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

15 sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said processing unit (DSS, VDM) and said sensed operation
20 request.

20. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

25 a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR) and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said
5 information generated by said processing unit (DSS, VDM) and said sensed operation request.

21. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a
10 vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises
15 sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation
20 request.

22. A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

25 a first processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

a second processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR), and

5 a third processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises
sensing means for sensing an operation request with respect to at least one
10 control unit (PT, ECB, STR), and

first calculation means for calculating first information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said first processing unit (DSS, VDM) and said sensed operation request,

15 second calculation means for calculating second information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said second processing unit (DSS, VDM) and said calculated first information, and

20 third calculation means for calculating third information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said third processing unit (DSS, VDM) and said calculated second information.

23. The vehicle integrated control system according to any of claims 19-22,
25 wherein each unit operates autonomously and in parallel.

24. The vehicle integrated control system according to claim 18, 19 or 22,
wherein said processing unit (DSS, VDM) or said first processing unit (DSS, VDM)

comprises

means for sensing environmental information around said vehicle,

means for sensing information related to a driver of said vehicle, and

processing means for generating information processed such that said sensed

5 information is shared among each said control unit (PT, ECB, STR).

25. The vehicle integrated control system according to claim 24, wherein said processing means includes means for generating information representing a degree of correction with respect to a request of said driver at each said control unit (PT, ECB,
10 STR).

26. The vehicle integrated control system according to claim 18, 20, or 22, wherein said processing unit (DSS, VDM) or said second processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared
15 among each said control unit (PT, ECB, STR), based on information for implementation of automatic cruising or pseudo automatic cruising of said vehicle.

27. The vehicle integrated control system according to claim 26, wherein said processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).
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28. The vehicle integrated control system according to claim 18, 21 or 22, wherein said processing unit (DSS, VDM) or said third processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared
25 among each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent with a control target, based on a current dynamic state of said vehicle.

29. The vehicle integrated control system according to claim 28, wherein said

processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).

30. The vehicle integrated control system according to any of claims 18-22,
5 wherein said control unit (PT, ECB, STR) comprises a driving system control unit (PT, ECB, STR) and a brake system control unit (PT, ECB, STR),

wherein said driving system control unit (PT, ECB, STR) and said brake system control unit (PT, ECB, STR) have a driving force and braking force distributed with respect to a requested driving force so as to realize a desired behavior of the vehicle in
10 co-operation.

31. The vehicle integrated control system according to any of claims 18-22,
wherein each said control unit (PT, ECB, STR) further includes means for controlling such that reflection of information from said processing means is rejected.
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32. The vehicle integrated control system according to any of claims 20-22,
wherein each said control unit (PT, ECB, STR) further includes means for providing information to said processing unit (DSS, VDM), said second processing unit (DSS, VDM) or said third processing unit (DSS, VDM).
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33. The vehicle integrated control system according to any of claims 18-22,
wherein each said control unit (PT, ECB, STR) is realized by each ECU, and operation is executed at said each ECU from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator.
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34. The vehicle integrated control system according to any of claims 18-22,
wherein

said driving system control unit (PT, ECB, STR) is realized by a first ECU,

said brake system control unit is realized by a second ECU,
said steering system control unit is realized by a third ECU,
operation is executed from an upper control hierarchy corresponding to a
request of a driver towards a lower control hierarchy corresponding to each actuator at
5 each said ECU,

said processing unit (DSS, VDM) is realized by a fourth ECU differing from said
first, second and third ECUs,

said first to third ECUs have an operation controlled in parallel, and

said fourth ECU is connected to an upper control hierarchy side of said first to
10 third ECUs via an interface.